



IKER IN THE GULF COAST COUNTRY, WITH NOTES N THE EXTENT OF CITRUS CULTURE IN THE LOCALITIES VISITED

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Mr. President, Ladies and Gentlemen:

When no longer any reasonable doubt remained but that a new citrus disease had made its appearance in Florida, that at least one infection had been sent to us from Texas, and specimens were received from Alabama, it seemed pertinent, this spring, that some one should make a visit to the Gulf Coast country for the purpose of getting some idea of the distribution and seriousness of this new disease. Efforts to elicit definite information by correspondence had failed, as no one seemed to know anything definite about it. When the writer broached the desirability of such a visit before the State Board of Control at their meeting in March, it became at once a foregone conclusion that he would be sent to make the investigation.

To better bring the situation before you, this brief recapitulation is inserted here: The new disease, now known as *citrus canker*, had been discovered in two far separated localities in Florida. Near Monticello in West Florida, the writer had found it in about 20,000 small nursery trees consisting of some satsuma and pomelo on C. T. (*citrus trifoliata*) roots and some C. T. stock. Near Silver Palm, south Dade County, Mr. E. V. Blackman, Deputy Inspector in that county, had discovered it in about 20,000 pomelo and some oranges, all on sour roots, with ap-

proximately another 80,000 trees more or less exposed to the infection. This was all nursery stock. Suffice it to state here that certificates, permitting any of this stock to be sold, were promptly withheld, and treatment recommended, thus practically placing the infected stock in quarantine. In each instance the information then available was to the effect that the seedlings used for roots had come from Texas. This proved true, however, only for the sour seedlings used at Silver Palm, which came from Port Arthur, Texas. A recent letter from J. H. Girardeau, Jr., formerly a nurseryman at Monticello, states that he imported the C. T. seedlings, used at Monticello, directly from Japan, about February, 1910.

Leaving Gainesville, Florida, on the morning of March 14th, the afternoon was spent at Monticello to again look over the situation there. The places visited in other states were Auburn, Mobile and Grand Bay, Alabama; Biloxi, Gulfport and Wiggins, Mississippi; New Orleans and Happy Jack, Louisiana; Port Arthur, Noma, Alvin, Brownsville, McAllen and San Benito, Texas; and Matamoros, Mexico.

ALABAMA

At the Board of Trade rooms in Mobile, the writer was informed that one and one-half million trees had been planted

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during this season on something over 13,000 acres, in the vicinity of Mobile, Grand Bay and other places.

Along the L. & N. Ry., toward Grand Bay, one sees creditable plantings here and there, ranging from a few acres to perhaps 20 or 30. At Grand Bay the acreage must be estimated by the hundred. These trees are all on C. T. roots and consist primarily of satsuma, with some pomelo and sweet orange. The oldest plantings appear to be 4 or 5 years old.

The fact that two nursery companies from Florida, the Griffing Brothers Company, and Miller and Gossard, have each established nurseries in Alabama, presages something of what the extent of citrus planting may become. A large part of the supply of trees now comes from Florida, Mississippi and Texas.

Seedling trees, whether sweet or sour orange, the largest probably 10 to 15 years old, were visible here and there in house yards. Some hardy hybrids were the only citrus trees seen at Auburn.

In Alabama, the writer first stopped at Auburn, in order to consult with the Nursery Inspector and Plant Pathologist of the College and Experiment Station. Dr. Wolf, Plant Pathologist, had just returned from the Mobile section with definite information as to the extent and localities infected. He reported the disease at Mobile, Grand Bay, Axis and Fairhope.

At Mobile and Grand Bay, everything that Dr. Wolf had reported was verified. At the shipping grounds of the Saibara Nurseries in Mobile, carloads of nursery

stock, satsuma, pomelo and oranges were found. This stock was brought to Mobile from Alabama, Mississippi and Texas, to be sold and reshipped. Traces of citrus canker were noted in this stock, especially on pomelo and satsuma.

At Grand Bay, citrus canker was in evidence in every place visited, in the nurseries as well as in the groves. The most serious infection occurs in a small grove of 1000 grapefruit and satsuma trees, known as the Juvenal Grove. The oldest trees were planted about two years ago. The pomelo in this grove is most infected and badly crusted with canker on the younger growth. It appears that these trees are being retarded and forced to put out an excessive number of small branches which become diseased. Some treatment with Bordeaux mixture and defoliation had been made, but apparently without much success. No fruit was on the trees (March 17th). It should be noted here that the illustration of diseased pomelo (grapefruit) in Bulletin 122, Florida Experiment Station, came from this grove.

MISSISSIPPI

Judged by the number of small nurseries listed for Mississippi that offer citrus stock for sale, the extent of planting citrus in that state must be considerable. These are mainly along the line of the L. & N. Ry., at such places as Orange Grove, Pascagoula, Ocean Springs, Biloxi and Gulfport. An occasional planting may be visible from the railroad. At Biloxi, plantings to the extent of perhaps 60 acres were visited, with presumably hun-

dreds of acres lying farther out. The largest planting visited was at Wiggins, 30 miles north of Gulfport, where thousands of acres of cut-over pine land are being put on the market; there is already a new planting of something like 60 acres and a nursery here. The plantings in Mississippi are on C. T. roots and consist mainly of satsuma, with some pomelo and sweet orange. A 40-acre grove near Biloxi had many satsuma trees over 10 years old. The oldest trees at Wiggins were planted three years ago.

The writer searched for citrus canker only at Biloxi and Wiggins and found it only at the latter place. The disease is well established there and only the most drastic measures will ever succeed in eradicating it. The degree of infection of different varieties at Wiggins is as follows:

Pomelo—leaves, twigs, fruit;

C. T.—Twigs, no leaves or fruit present;

Navel—leaves, twigs, no fruit noted;

Med. Sweet—noted on leaves only;

Parson Brown—leaves, fruit, twigs;

Satsuma—leaves, rarely on wood.

When fruit is mentioned in the previous list information was furnished by the manager and foreman. The manager further informed me that he first noticed the disease in 1911 on C. T. seedlings from Japan.

LOUISIANA

Near New Orleans, on the south shore of Lake Pontchartrain, about 7,000 acres of land have been reclaimed by diking. Two large pumping stations have been erected to pump off the surplus water.

The Lake Shore Land Company, through Symmes, Means, and Chandler, agricultural engineers, is carrying on these operations, and plans to set out a large acreage of citrus on trifoliata roots. Thirty thousand budded trees had just been planted, besides a nursery of 250,000 trifoliata seedlings, obtained from Arcadia, Texas. It is planned to sell this land and plantings in small tracts to settlers.

Below New Orleans, on the Mississippi River, considerable citrus has been planted. Trees 1 to 14 or 15 years old were seen at Happy Jack. At this point the Louisiana Orange Groves Company, of which Mr. Geo. H. Penn is President, has a splendid grove of about 70 acres, consisting of sweet oranges, navels, mandarins, and pomelo. Trees on sour orange roots appear to be doing better than trees on trifoliata roots, although some splendid trees on the latter roots, on better drained land, were in evidence. Between Happy Jack and New Orleans, a particularly fine citrus grove belonging to Mr. R. S. Moore, was noted at Naomi. Beyond Happy Jack, farther down the river, more extensive plantings of citrus were reported.

Citrus canker was not found at Happy Jack. On Lake Pontchartrain it is more than likely that it will soon be in evidence. At the latter place extensive shipments of stock have been received from Texas, where citrus canker is common, particularly the 250,000 trifoliata seedlings previously noted. The writer found citrus canker on a budded tree from Texas, but could not prolong his search

sufficiently to identify it on the 250,000 trifoliata seedlings.

TEXAS

At Port Arthur and at Nona, 40 miles north of Port Arthur, there is an extensive nursery business consisting largely of citrus. Satsumas appear to be the principal variety of citrus planted and these do well here. The writer had the privilege of sampling some satsuma fruit that had hung on the trees all winter and found it excellent. This was on March 24th.

At Alvin and vicinity there are extensive plantings of satsumas, but some oranges, pomelos and lemons, all on trifoliata roots, have also been planted. An extensive nursery business, principally citrus, is also carried on. On account of a heavy rain setting in, only about one-half day could be spent here in looking about.

Brownsville, McAllen and San Benito, in Southern Texas, were next visited. Citrus trifoliata roots fail in this part of Texas and sour orange roots are mainly employed. Many young citrus trees are being planted and the nurseries at McAllen and San Benito are prospering. All this, notwithstanding the fact that citrus in Texas was seriously injured by cold in 1911. Sour, bitter-sweet, and other citrus seedlings appear to thrive well in Brownsville, and while commercial plantings in this part of Texas are generally irrigated, seedling trees in house yards at Brownsville thrive without it. In general, it is apparent that Texas intends to continue in citrus culture.

At Port Arthur, citrus canker was present in the principal nursery there. Pomelo, trifoliata, sweet orange, satsuma, mandarin, tangerine, all except kumquat, were found infected. Four or five oranges, on a sweet orange tree capable of bearing several boxes of fruit, were found infected with canker. One of these oranges had at least a dozen cankers on the rind, while the others had only two or three.

No citrus canker was found at Nona, although trifoliata seedlings from infected territory at Port Arthur had recently been planted there.

At Alvin the disease was found on:

Duncan pomelo—leaves and twigs;

Citrus trifoliata—twigs;

Dugut orange—leaves only;

Villa Franca lemon—leaves and twigs (small trees exposed to disease among C. T.);

Ponderosa lemon—leaves (small trees exposed to diseases among C. T.);

Kumquats—not found infected.

To what extent citrus canker is generally distributed in the Alvin section was not determined, since, as previously stated, excessive rains interfered with the writer's getting about.

None of the citrus canker was found in south Texas. A full day was spent inspecting trees at Brownsville, but only a few hours each, between trains, at McAllen and San Benito. Not finding any of this disease in south Texas, nor at Matamoros, Mexico, disposes of the surmise that it might have been introduced from Mexico.

MATAMORAS, MEXICO

Several hours were also spent at Matamoras, across the Rio Grande River from Brownsville. Several dozen orange trees, apparently all sour seedlings, were examined about the town, but no citrus canker was found.

VARIETIES INFECTED AND INJURIOUSNESS

Citrus canker has now been observed on the following varieties and species of citrus. The order adopted is according to the degree of infection observed. Pomelo, or grapefruit, is most seriously infected and heads the list. When fruit or twigs are not mentioned that simply indicates that no observations have been made:

Pomelo—leaves, twigs, fruit;

C. T.—leaves, twigs;

Key Lime, or Wild Lime—leaves, twigs;

Navel—fruit, leaves, twigs;

Sweet orange—leaves, twigs, fruit;

Satsuma—leaves, twigs;

Tangerine—leaves;

Mandarin—leaves;

King orange—leaves;

Lemon—leaves, twigs;

Kumquats—appear to be immune.

The greatest danger from this disease, for Florida, lies in the fact that it is principally a pomelo disease. As already stated, it attacks the twigs of these trees virulently, resulting in a putting out of more twigs, thus overloading the trees with small branches. It is also virulent in the manner in which it affects the leaves, spotting them, causing them to turn yel-

low and dropping prematurely. The worst of it, however, is the manner in which it affects the fruit. Judging by the few fruits that have come under observation, it appears safe to estimate that at the very least one-half of a grapefruit crop would be made unmarketable or reduced to culls, although probably not ruined for eating, as the cankers are only skin deep. It requires no extensive mathematical knowledge to discern that this disease may cause losses aggregating millions of dollars, if not eradicated.

It must be admitted, on the other hand, that, after all, we may know but little about the effects of this disease. There has been no opportunity to observe it in larger trees bearing considerable quantities of fruit. The fruit available was sent in by correspondents, and the writer himself found only one small specimen of grapefruit in the nursery at Monticello, but all of these had dozens of cankers on the skin. The pomelo trees at Grand Bay, Wiggins, and Alvin had no fruit on them at the time of examination.

While it is quite apparent that oranges are far less susceptible, it is also apparent that a large percent would become spotted and have to be sold as culls. The few fruits on a sweet orange tree at Port Arthur, Texas, previously referred to, indicate this:

ORIGIN OF CITRUS CANKER.

The evidence at present indicates definitely that it was imported from Japan on C. T. seedlings, and probably on other citrus. K. Saibara, of the Saibara Nurseries, Mobile, Alabama, stated that he saw the disease first, in 1911, on trees

imported from Japan and planted in Texas, but had never seen it in Japan. W. C. Griffing, of Grand Bay, Alabama, first saw it on C. T. seedlings from Japan, in Texas. Mr. J. Klumb, Manager of the Mississippi Farms Company, of Wiggins, Mississippi, first saw it in 1911 on C. T. seedlings imported from Japan. That all of this disease in Florida has not been sent to us directly from Texas is made clear in a letter just recently received from J. H. Girardeau, Jr., who imported the C. T. Seedlings for two of the infected plantings at Monticello. He writes: "I remember the blocks of trifoliata stock you mention, and these were imported stock, directly from Japan."

To what extent citrus canker is prevalent in Japan is not known. That it is there, was recently demonstrated beyond doubt by the receipt of specimens of this disease on leaf and rind of navel orange, directly from Japan. Professor B. F. Floyd, of the Florida Experiment Station, received these specimens during the middle of May, from a Japanese Plant Pathologist at the Kyu-shu Laboratory, Imperial Agricultural Experiment Station, Kumamoto, Japan. They were labeled "scab," indicating that citrus canker has hitherto been mistaken for citrus scab by the Japanese. That is exactly what happened in this country—the first specimens of canker sent in were diagnosed as "scab," and it was only when an abundance of material became available that the writer successfully prevailed in his belief that the disease was not citrus scab (*Cladosporium citri*).

CAUSE OF CITRUS CANKER

This has been recently determined by Professor H. E. Stevens, of the Florida Experiment Station, to be a fungus.

THE SITUATION IN FLORIDA

All the infected stock at Monticello, except a small isolated block, has been dug and piled ready to be burnt. The small isolated block just referred to has been cut back to stumps and sprayed with Bordeaux mixture under the writer's supervision, and the owners will spray it several times more.

The infection at Silver Palm has been repeatedly treated with Bordeaux mixture, but some of the disease can still be found. Arrangements are being perfected to cut back all this stock to single stems or stumps and paint it with 2-2-2 Bordeaux, or 50 per cent. carbolinum.

The Florida Growers and Shipper's League, of which Mr. Lloyd S. Tenny is Secretary-Manager, are raising 2,000 dollars to assist in discovering new infections and to advise with the owners as to the proper methods to be employed for eradicating them. It is planned to place a regular deputy, under the direction of this office, but paid by the League, in the field for this purpose. He will begin to make this inspection in south Dade County, and later in other parts of the State where infections are suspected.

Shipment of citrus stock into Florida, from infected localities in the other Gulf States, have been made, and it is planned to look these up as soon as possible. At least two nurserymen in Alabama have furnished the writer with a list of their shipments into Florida during the past year or two.



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